

Current Literature.

Curious Migration of a Revolver Bullet.—*Le Caducée* quotes the following from the *Wiener klin. therap. Woch.* A man was shot in the chest with a revolver; the bullet penetrated the fifth intercostal space in the mammary line, and probably reached the pericardium. Four years later, the bullet could be felt in a right congenital scrotal hernia. Six months later, the man was operated on for hernia, and the bullet was found in a small peritoneal sac which was itself enclosed in the hernial sac.

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Lieutenant-Colonel (R.P.)

The Totsuka Stretcher.—Surgeon-Major Matignon, in *Le Caducée* for February 3rd, describes a new form of stretcher in use in the Japanese Navy.

Japan is the only Naval Power which, during the last ten years, has had an opportunity of testing its medical *matériel*, for in the Spanish-American War and the last China Campaign, the fleets had only insignificant opportunities of utilising their medical equipment. During the first war with China, the Japanese naval surgeons had an excellent opportunity at the battle of the Yaloo of dealing with many cases of dead and wounded, and consequently many kinds of apparatus were invented for removing the wounded from where they fell to the dressing-station.

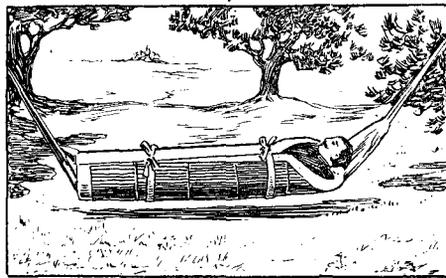
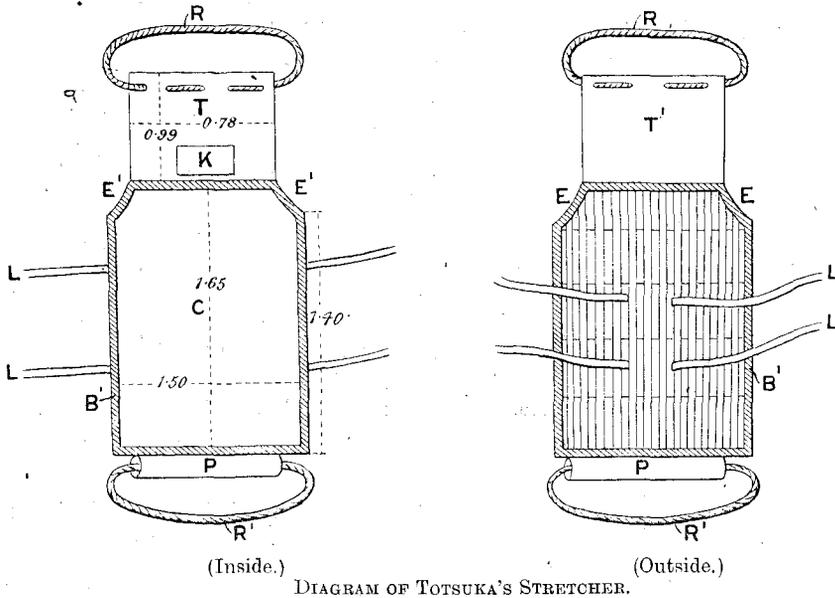
Through the courtesy of Professor Yabe, of the Naval Medical School at Tokio, Surgeon-Major Matignon was enabled to see the working of the ingenious and practical apparatus of Mr. Totsuka, designed by him for *dragging the wounded* along the decks of the war-ships. The word "stretcher" is therefore not an appropriate one for describing this apparatus, which is designed rather for the *haulage* than for the *carriage* of the wounded.

Totsuka's apparatus is, briefly, an instrument for rendering the patient immovable by wrapping him up in a covering which is rigid and yet elastic. It consists of a body with a few accessories.

The body of the apparatus (C) is made of strong sailcloth, strengthened externally with split bamboo laths, about $\frac{3}{4}$ of an inch wide; the upper corners (E, E) are cut away; the front or inner surface is usually padded with horse-hair, the folds of the stuffing running lengthwise. Two stout cloth girths (L, L) are fixed to the back or outer surface. The head-piece (T) is of sailcloth and fixed to the apparatus, its upper part is perforated with holes through which a strong hempen rope (R), two yards long, is threaded. The foot-piece (P) forms a running noose and is also of stout sailcloth through which a rope about 7 feet long is passed (R¹).

This so-called stretcher rolls up on itself for carriage and then looks like a rolled-up bamboo blind. It weighs about 20 lbs. if not padded, but about 33 lbs. if padded. When required for use, the apparatus is unrolled and laid out flat. The patient is placed lengthwise on it with

his head resting on the cushion (K), the two sides are then folded over him, being made to overlap as far as possible, and then the two girths (L, L) are tightly fastened. The lower rope (R¹) is now drawn taut so as to tighten the lower noose and thus prevent the patient from slipping through this end. The patient (who now looks somewhat like an



THE LOADED STRETCHER.

Egyptian mummy) can now be carried by two men, by means of the two ropes (R, R¹), or more usually drawn by one man hauling it by the head rope (R), along the deck to the nearest manhole, when the loaded stretcher is hooked up on end and lowered to the between-decks, when he is now dragged to the dressing station.

This apparatus has given excellent results. It has, moreover, the advantage of reducing itself even when loaded to a minimum volume.

which admits of its passing through openings which would be impassable for an ordinary stretcher, a condition of the utmost importance on board ship.

Whilst of greater interest for our comrades in the sister service, some of our brother officers who are interested in the question of stretcher-sledges for mountain use may possibly find in Totsuka's apparatus an idea which they can utilise when devising some new contrivance for hauling patients over the snow in winter time.

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On the Differentiation of Trypanosomes.—Koch, in the *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, xlvii., 1905, contributes a paper on this subject. He introduces the subject by discussing the difficulties of differentiating the known varieties of trypanosomes. He believes that, with the exception of *Trypanosoma theileri* and *lewisi*, it is impossible either by the microscopic examination of the parasite in the blood of the diseased animal or by inoculation experiments into other animals to distinguish the commonly known varieties of trypanosomes, e.g., *T. brucei*, *T. evansi*, *T. equiperdum*, *T. equinum*, *T. gambiense*. Koch, however, affirms as the result of his recent investigations in East Africa that he has discovered a means of differentiating the varieties of trypanosomes. He says: "I find in *Glossina morsitans* and *G. fusca*, which both carry the tsetse-fly disease (*T. brucei*), also in *G. palpalis*, which plays the same part in sleeping sickness (*T. gambiense*), undoubted developmental forms, and amongst these there are certain forms by means of which it is possible by their morphological characters to distinguish the two trypanosomes. It is highly probable that when the complete developmental cycle is worked out that still further differential characters will be got." In the alimentary canal of the fly he speaks of an enormous increase of the trypanosomes which are taken in. These trypanosomes fall into two types. The one type is distinguished by its broad diameter, large amount of plasma, which stains blue with Giemsa and Romanowsky stains, and round nucleus having a loose texture. The other type has a narrow diameter and therefore has a thin form, a complete absence of blue-staining plasma and an almost rod-shaped nucleus of compact texture which takes on a dark regular chromatin stain. At first sight it might appear that there were two different varieties of trypanosomes. He eliminates this by stating that they are always found together and only in infected specimens of the *Glossina*, and so they must be dependent on and be derived from the trypanosomes taken in with the blood. He regards the first type of trypanosome as the female and the second as the male. He compares the sexual forms of *T. brucei* and *T. gambiense* and finds certain differences which permit him to separate the two varieties. The first point is the relative sizes of the blepharoplasts (centrosomes) in the female types. *T. brucei* has a small rounded blepharoplast of 1.0 mm. diameter. The *T. gambiense* has a remarkably large and deep-staining blepharoplast; it is 1.5 mm. broad and 2.5 mm. long. It is oval and sometimes has a rod-shaped appearance. A very marked character is that it always lies at right angles to the long axis of the body of the trypanosome. A second differential characteristic is the relative sizes of the male types

of both trypanosomes. This is probably of less value than the first. In general, the female forms of *T. brucei* appear smaller than those of *T. gambiense*; the reverse is the case in the male types. The following are the exact measurements:—

		Length, mm.	Breadth, mm.
<i>T. brucei</i>	} Female	25	3·6
<i>T. gambiense</i>		37	3·0
<i>T. brucei</i>	} Males	40·2	2·1
<i>T. gambiense</i>		34	0·85

Koch states that the above described characteristics are so well marked and so constant, that in every single case it permits one to determine to which variety the particular trypanosoma belongs. "I doubt not that in this way the important but unfortunately still open question of the identity or difference of *T. brucei* and *T. evansi* will be decided. In future a trypanosoma will not be completely described unless its developmental cycle, at least in its important parts, is described."

The above is an account of Koch's method of differentiating the varieties of trypanosomes. It will remain to be seen whether other observers confirm his results, as regards the interpretation of the morphological characters of the trypanosomes met with in the alimentary canal of *Glossina*. Minchin's work in Uganda will have a special interest in this relation, and the results of his observations will be read with much interest. In the meantime the method of Novy and McNeal, by culture on blood agar, for the differentiation of trypanosomes is more exact than that of Koch's, because they are dealing with a pure culture of the parasite, whilst in the stomach of the fly it is impossible to say how many varieties of trypanosomes may exist. It is very easy to fall into a fallacy under these conditions, as Novy showed in connection with Schaudinn's work, that he was dealing with mixed cultures of protozoa instead of, as he thought, with a single variety. In connection with the differentiation of *T. brucei* and *T. evansi*, which Koch still regards as open, it is interesting to note that Novy, McNeal and Hare state "that this trypanosome (*T. evansi*) is differentiated by its cultural characteristics from *T. lewisi* and from *T. brucei*."

E. D. W. GREIG.

Phagocytosis in Vitro.—Ever since Denys and Leclef published their work on phagocytosis *in vitro* (*La Cellule*, 1895, t. xi., p. 177), and laid the foundation of that modern method of investigating infections—the determination of the opsonic index—the validity of their results has been questioned by some scientists. For instance: Metchnikoff (*L'Immunité dans les maladies infectieuses*, 1901, p. 298) doubted whether processes observed in the test tube could be rightly regarded as taking place in the living body. Denys and Leclef compared the bactericidal power of mixtures of the serum and leucocytes of normal rabbits, and those immunised against a streptococcus. Leucocytes, whether derived from the vaccinated or unvaccinated animal, were incapable of taking in and digesting streptococci in contact with normal serum. On the other hand, a preliminary treatment of the streptococci with the serum of the immunised rabbit enabled leucocytes from both sources to seize the cocci. Metchnikoff, while criticising their conclusion, said: "Researches pursued

over a long period have shown that phagocytosis *in vitro* indicates but imperfectly the sequence of events in the living organism. Very often the leucocytes fail to display their phagocytic function, although they are still motile, and, when transferred to the peritoneal cavity, eagerly receptive of bacteria."

Modern work on the influence of the immune bodies in phagocytosis explains this apparent anomaly. Nevertheless, Löhlein (*Annales de l'Institut Pasteur*, October, 1905) has taken up the discussion, and has established the worth of observations of the phagocytic powers of cells outside the body. He experimented with the leucocytes from human blood, and from the peritoneal cavity of guinea-pigs. The exudate withdrawn five to eight hours after an injection of sterile broth into the abdomen is rich in polynuclears. He found that there was no essential difference in the phagocytic process, whether the field of encounter was the peritoneal sac of the guinea-pig or the test tube. In every case where bacteria were englobed *in vitro* the same phenomenon took place *in vivo*. His experiments go far to strengthen the position of workers on opsonins who deal exclusively with ingestion of microbes by leucocytes in the moist chamber or tube. Löhlein also has repeated Metchnikoff's experiment of washing leucocytes free from plasma and of suspending them in urine. They still retain the power of taking up bacteria. Even virulent cholera vibrios were received and transformed into granules without the aid of any of the substances dissolved in the blood which favour phagocytes. He tried the effect of various other secretions, such as aqueous humour, as a medium in which he suspended the washed leucocytes. These were of no more service than physiological salt solution. Phagocytosis of virulent anthrax bacilli by washed white cells began almost immediately, even at laboratory temperature. Several leucocytes combined to compass the destruction of a long anthrax thread. Human phagocytes behaved in the same way as those of the guinea-pig. *Staphylococcus aureus* was rapidly englobed *in vitro*, but some virulent strains of streptococci were rejected, while harmless varieties were received. The behaviour of the cells to diverse cultures of the *B. coli communis* was variable. Some were avoided, but others were attacked. These results prove that washed leucocytes can take up certain virulent and pathogenic bacteria. The action of "stimulins," "opsonins," "fixateurs," "sensibilicatrices," "immune bodies," "amboceptors," which are probably names for the same thing, is relative only. Preparation of the bacteria with this substance renders their ingestion more rapid and the number seized greater, but is not always an essential factor for the process of phagocytosis *in vitro*.

C. BIRT.